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RESEARCH SUMMARY

Mar. 1993 RS–011

■ **Preliminary recommendations for development of Regional Wildlife Tree Retention Guidelines**

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A Close Look at Wildlife Trees

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INTRODUCTION

Wildlife trees are an important component of forest ecosystems and have become a focus of integrated forest management in British Columbia. A wildlife tree is defined as a tree (dead or alive) *which provides present or future critical habitat for maintenance or enhancement of wildlife* (Backhouse and Lousier 1991). Its value for wildlife may be provided by one or more physical attributes such as structure, age, condition, species, geographic location, or surrounding habitat features. In British Columbia, more than 90 wildlife species, or approximately 16% of the province's native birds and mammals, depend on wildlife trees for nesting, food, or shelter. These include:

- cavity-nesting birds such as woodpeckers (Figure 1), chickadees, small owls, and some ducks
- open or platform nesters such as hawks, eagles and herons, and
- mammals such as bats, furbearers and caribou.

Conventional forest harvesting methods, silvicultural practices, utilization standards and worker safety regulations are systematically eliminating wildlife tree habitat in British Columbia. This constitutes a serious threat to the viability of many populations – to the extent that entire species of wildlife tree users are threatened. In response to this forest management problem, provincial (Manning 1992) and regional harvesting guidelines for the management and maintenance of wildlife trees are currently being developed. However, these guidelines have not been evaluated with respect to actual site-specific wildlife tree use.

In the spring of 1992, a wildlife tree research project was initiated within the West Arm Demonstration Forest, Kootenay Lake Forest District (Research Summary RS-003, Forest Sciences Section, Nelson 1992). This long-term project is designed to investigate stand-level effects of different silvicultural systems on the wildlife tree habitat and cavity-nesting bird community in the ICHdw and ICHmw2 biogeoclimatic subzones. Our main study objectives are to describe the existing wildlife tree habitat and use by cavity-nesting birds, and to investigate how birds respond to different levels of volume removal and associated declines in wildlife tree densities (for further details, see Steeger and Krebs 1993).

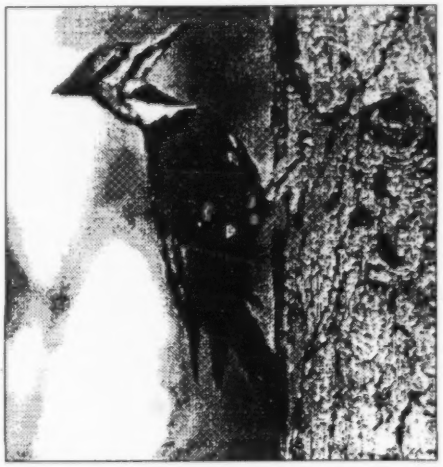

Figure 1: Pileated Woodpeckers require large wildlife trees for nesting, feeding, and shelter.

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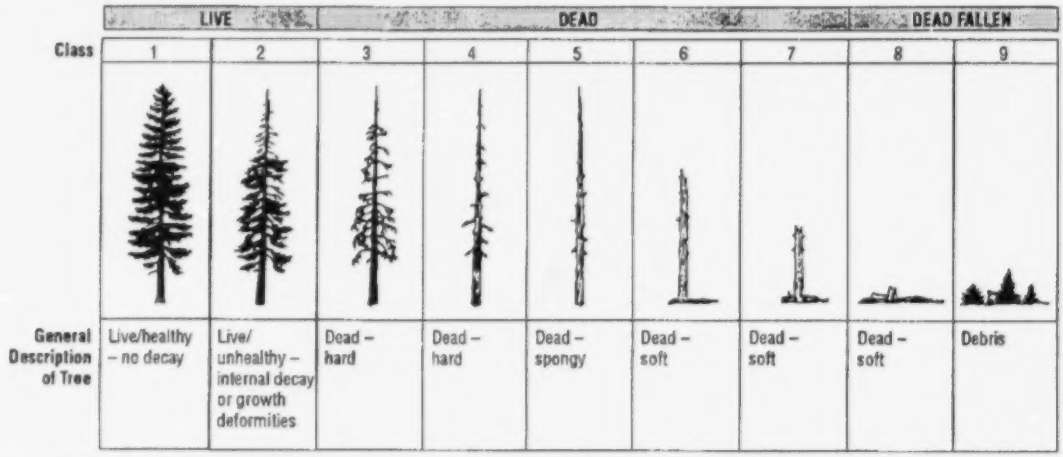


Figure 2: Wildlife Tree Classification System for British Columbia (Backhouse and Lousier 1991)

Here we report on the progress of the study, including descriptive results and preliminary recommendations for the development of Wildlife Tree Retention Guidelines. The first research harvesting trials are planned for the fall of 1994.

STUDY AREA

During 1992, field work was conducted on two uncut 30 ha sites within the Kokanee Creek (ICHdw) and Redfish Creek (ICHmw2) drainages of the West Arm Demonstration Forest. The ICHdw site is located within a Ponderosa Pine Ecological Reserve and contains a component of large veteran snags; the ICHmw2 site is primarily a mature Douglas-fir stand.

METHODS

Wildlife tree surveys were conducted by establishing 30, randomly chosen, 0.04 ha circular plots on each study site (i.e. one plot/ha). Plots were arranged (100 m apart) along transects on a uniform grid and, within each plot, the number, species, diameter breast height (dbh), height, and decay stage of all wildlife trees were determined. Use of wildlife trees was measured by counting the number of old and new nest cavities per tree as well as woodpecker feeding excavations along the first three meters of the lower bole. Distribution of wildlife trees used for nesting and feeding was determined by recording habitat features such as root disease centres, forest clearings or deciduous patches.

Active cavity nests were located by following individual birds along surveyed transect lines and by searching between transects. Nests outside the 30 ha sites were included in the sample as long as the bird was first detected within the site. Nest trees and all wildlife trees were characterized as per transect plots.

RESULTS

WILDLIFE TREE HABITAT – A total of 132 and 178 wildlife trees were sampled within the ICHdw and ICHmw2 sites, respectively. Wildlife trees included in this sample were: (i) either coniferous or deciduous; (ii) of decay class 1-9 (Figure 2); and (iii) >10cm dbh. Densities of wildlife trees and of trees with nest cavities and woodpecker feeding excavations for each site are given in Tables 1 and 2 respectively. Overall, 49% (ICHdw) and 40% (ICHmw2) of the total wildlife trees sampled were used for nesting and/or feeding.

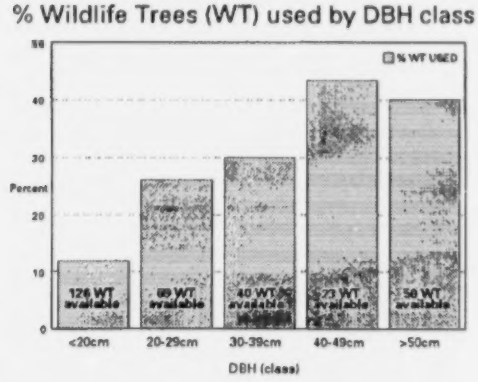
The most prominent habitat feature associated with used wildlife trees was Armillaria root rot centres. A total of 68% (or 13 of 19) of all active nests were located within, or on, the periphery of such centres. Woodpecker feeding excavations were found on 46% of all wildlife trees associated

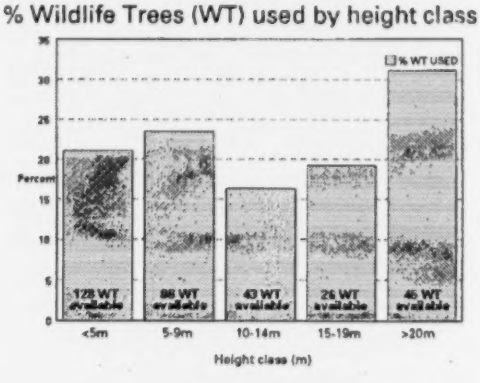
Table 1:
Densities of wildlife trees (WT) by species and subzones

	ICHdw		ICHmw2	
Species	Number WT/ha	% of total WT sampled	Number WT/ha	% of total WT sampled
Douglas-fir	75.0	68.2	120.8	81.5
Grand Fir	3.3	3.0	–	–
Subalpine Fir	–	–	2.5	1.7
Western Larch	3.3	3.0	–	–
Lodgepole Pine	1.7	1.5	5.8	3.9
Ponderosa Pine	24.2	22.0	–	–
Western White Pine	–	–	1.7	1.1
Total Conifers	107.5	97.7	130.8	88.2
Douglas-maple	–	–	5.0	3.4
Trembling Aspen	–	–	3.3	2.2
Paper Birch	2.5	2.3	6.7	4.5
Black Cottonwood	–	–	2.5	1.7
Total Hardwoods	2.5	2.3	17.5	11.8
TOTALS	110.0	100	148.3	100

with root rot. This suggests that root rot centres constitute an important habitat feature for nesting, as well as feeding requirements of cavity-nesting birds.

WILDLIFE TREES USED FOR NESTING – A total of 19 active nests (ICHdw=13, ICHmw2=6) of primary cavity excavators were located during June and July. Red-breasted Nuthatches and Chestnut-backed Chickadees primarily nested in conifers (85%) while woodpeckers (Red-naped Sapsucker, Hairy Woodpecker, and Three-toed Woodpecker) prefer to nest in hardwoods (83%). The former are considered 'weak excavators' while woodpeckers are considered 'strong excavators'. The characteristics of the nest trees for these two groups are summarized in Table 3. The results confirm that large-diameter trees and decay stages 2-5 are important for nesting and that nest trees should be at a minimum 15-20m in height.





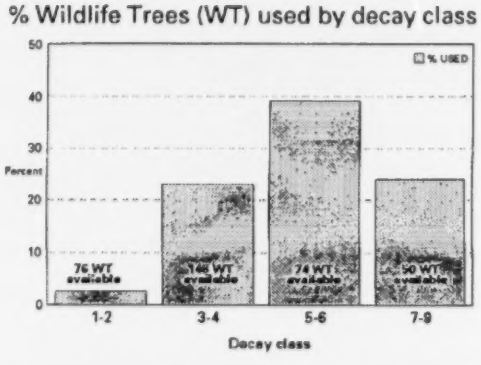


Figure 3: Characteristics of wildlife trees used for woodpecker feeding. Both subzones are combined.

WILDLIFE TREES USED FOR FEEDING – For the purpose of characterizing wildlife trees used for feeding by woodpeckers, only trees with evidence of new feeding excavations were used. Within the total sampling area of 2.4 ha, 77 wildlife trees (ICHdw=33, ICHmw2=44) showed evidence of new feeding excavations. Figure 3 describes the types of wildlife trees used for feeding. These results suggest that wildlife tree retention for woodpecker feeding habitat should include trees of dbh >30cm, preferably >10m high, and the more advanced decay stages 3 - 9. Hardwoods are important feeding trees for sapsuckers.

DISCUSSION

Due to the advanced age of the stands examined in this study and the high incidence of root disease, wildlife trees were abundant and nearly 50% of them showed evidence of nesting and/or feeding. Veteran snags, in particular, were extensively used by wildlife.

Proposed standard operating procedures designed to eliminate disease centers (e.g. pushover logging and stumping) should proceed with caution in light of the role of disease agents in wildlife tree recruitment. Even stumps (which feller bunchers, for example, could leave at 3-5 m in height) can be useful habitat for many wildlife species.

Feeding requirements of woodpeckers (especially during winter) should receive as much management consideration as nesting requirements. Woodpeckers are territorial, year-round residents of mature forests and are potentially limited by the availability of wood-boring insects in winter.

	WT/ha with nest cavities[1]			WT/ha with feeding excavations[2]		
Subzone	ONC	NNC	TNC	OFE	NFE	TFE
ICH dw	4.2	1.7	5.8	49.2	27.5	55.0
ICHmw2	0.8	–	0.8	45.8	36.7	60.8

[1] ONC = old nest cavities, NNC = new nest cavities, TNC = total nest cavities

[2] OFE = old feeding excavations, NFE = new feeding excavations, TFE = total feeding excavations

Table 2. Densities of wildlife trees (WT) with nest cavities and woodpecker feeding excavations by subzone.

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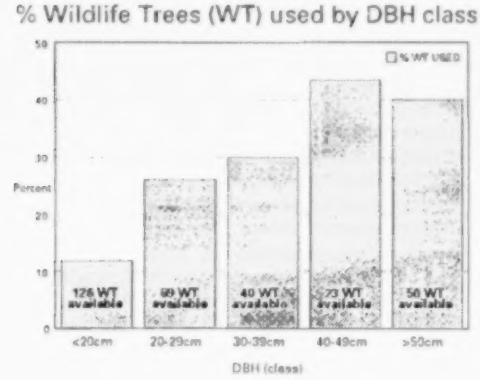

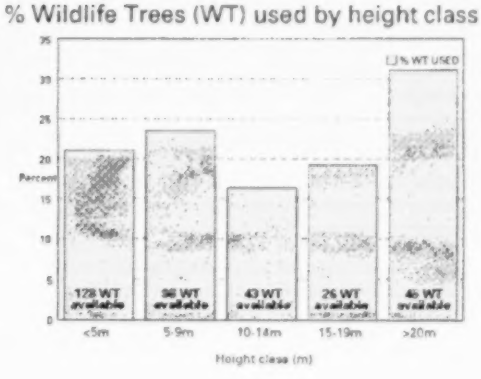

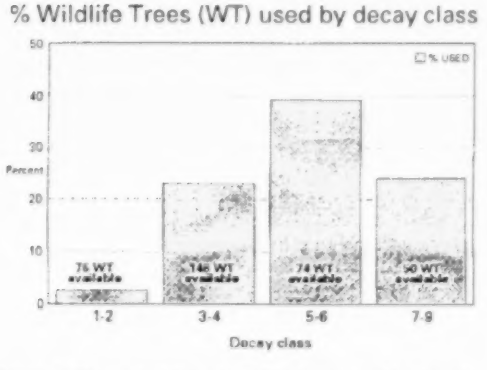

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RECOMMENDATIONS FOR WILDLIFE TREE RETENTION

1. Regarding the most desirable characteristics of retention wildlife trees, our data confirm the recommendations of the provincial wildlife tree management guidelines (Manning 1992): "...selected wildlife trees should be as large as possible for the site, given the nature of the trees which occur naturally in the area. A recommended range is >30 cm dbh and > 15-20 m height... selected wildlife trees should consist of hard and soft snags (Class 2-5)." Veteran (dead and live) wildlife trees have very high habitat value and should be retained whenever possible.

2. As an alternative to the provincial wildlife tree retention guideline which calls for the retention of 5-10 wildlife trees/ha (deficiencies of this guideline are described in Manning 1992), we propose the following formula for calculating the number of wildlife trees that should be retained during harvesting. This formula considers essential nesting and feeding requirements of cavity nesters. It is based on empirical data and will be further developed for stand, as well as landscape level, forest management.

Table 3:
Characteristics of trees with active nests for both subzones combined

	Weak Excavators (n=13)		Strong Excavators (n=6)	
Tree species	Douglas Fir (8), Ponderosa Pine (2), Larch (1), Aspen (1), Birch (1)		Aspen (2), Birch (3), Ponderosa Pine (1)	
Variable	mean (SE)	range	mean (SE)	range
DBH (cm)	42.3 (6.6)	17-97	43.7 (12.2)	24-104
Height (m)	13.8 (2.0)	3.4-25.3	20.6 (5.6)	8.1-47.1
Decay Stage (1-9)	5.1 (0.2)	4-7	2.7 (0.7)	1-5

PROPOSED FORMULA

W = A x B x C, where

W = number of wildlife trees to be retained/ha

A = number wildlife trees/ha currently used for nesting and feeding.

B = proportion of A in preferred dbh, height and decay classes.

C = proportion of A that should be retained based on landscape level habitat integrity (C=1: severely disturbed habitat; C << 1: relatively intact habitat; the value for C in an undisturbed habitat should be the minimum proportion of the habitat required for viable population levels of wildlife tree-dependent species; further research is required to quantity C_{min}).

Example: Kokanee Creek, ICHdw, based on 1992 data. Given:

A = 27.5 - number of trees with current nesting and feeding sign (Table 1; Note: all trees used for nesting were also used for feeding).

B = 0.64 - proportion of available wildlife trees $\geq$ 20 cm dbh, $\geq$ 5 m height, and in decay classes 3-6 (calculated from the values in Figure 3).

C = 0.80 - estimated value based on habitat integrity in Kokanee Creek.

then: **W** = 27.5 x 0.64 x 0.80 = 14

Note: The number of live trees required to ensure a constant rate of wildlife tree recruitment is not part of this formula and requires more research and discussion. It is, to some extent, dependent on death rate of trees, falling rate of snags, and the rotation time used in different silvicultural systems.

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